Docket No. GLM-1062

ELECTROMECHANICALLY ACTUATED OUTRIGGER

Cross-Reference to Related Application:

This application claims the benefit of U.S. Provisional Patent Application Serial No. 60/464,154, filed April 21, 2003.

Background of the Invention:

Field of the Invention:

The invention lies in the field of boating and fishing equipment. The invention relates to a fishing outrigger to be attached to a boat.

Fishing outriggers have been used on boats for decades. Outriggers are attached to a frame somewhere on the boat and, in typical embodiments, pivot from a stowed position to a fishing position. In the stowed position, a plane intersecting the outrigger longitudinal axis is at a first angle to or parallel with a plane intersecting the central bow to stern axis of the boat. In comparison, in the fishing position, the plane intersecting the outrigger longitudinal axis is at a second angle to the plane intersecting the central bow to stern axis of the boat, the second angle being greater than the first angle.

Some outriggers also can move between a lowered position and a raised position as well. Such movement is beneficial when the boat is passing under an overpass or obstruction above the water and contact between the outrigger and the overpass needs to be avoided. The lowered position as referred to herein is a position that is closer to parallel with a water surface than the raised position. In other words, the raised position is at a first angle with respect to the water surface and the lowered position is at a second angle with respect to the water surface, the second angle being smaller than the first angle. Of course, the second angle can be equal to zero degrees (i.e., parallel to the water surface) or less than zero degrees (i.e., pointing towards the water but, typically, not touching the water).

Because of the inherent length of the outriggers, large torques are present at the pivoting area, which is, typically, the sole point of contact between the outrigger and the boat. Some outriggers include bracing bars to counteract and/or reduce such torque, but these bars present a second fastening point of the outrigger to the boat. Such a configuration presents a disadvantage where the boater does not want two points of contact, where only one area for contact is available, and/or where two points of contact are cost prohibitive.

When the contact point for an outrigger is only available on a T-top, each of these disadvantages become significant. High torques must be compensated for. Only one point of contact is available. Both stowed/fishing and lowered/raised degrees of movement are needed. Further, because T-tops are not as strong as fishing towers or as integrated cabin walls/surfaces, the total weight of the outrigger assembly must be as low as possible.

Adjustment of most outriggers constructed for use on boats equipped with a T-top, hard top, radar arch, or other member capable of supporting the outriggers requires manually accessing the outrigger boom itself for raising and lowering the outrigger boom. Immediate access can be required in many instances, especially when approaching low bridges, which may require the operator to leave control of the vessel while adjusting outriggers. Such access is also required when navigating in close proximity to other vessels, marinas, docking, rafting, etc. Due to the physical requirement of balancing on gunwales or otherwise accessing outriggers located on the top of boats generally, use by individuals unable to accomplish frequently required access has not been practical or safe and, for the most part, such outriggers are not used when frequent access is required. The advantage of this type of outrigger is that it is out of the way and, thereby, allows more freedom of movement for individuals in a

boat. However, such an advantage is negated by inaccessibility of the outrigger.

In smaller fishing boats, it is common for the captain to be the only person on the boat. Even for small boats, outrigger assemblies are not usually within easy reach of the captain's operating controls (steering and engine). Thus, an inherent danger is present if the captain needs to lower the outriggers while piloting the boat because the captain will need to let go of the controls for a period of time that is not safe. Accordingly, there is a need to make available to a captain an ability to move outriggers to a lowered position without having to take both hands off of the operating controls.

Summary of the Invention:

It is accordingly an object of the invention to provide an electromechanically actuated outrigger that overcomes the hereinafore-mentioned disadvantages of the heretofore-known devices of this general type and that compensates for high torques, only needs one point of contact, permits both stowed/fishing and lowered/raised degrees of movement, has a reduced and/or low total weight, and makes available to a captain an ability to adjust inaccessible outriggers to a lowered position without having to take both hands off of the operating controls.

With the foregoing and other objects in view, there is provided, in accordance with the invention, an electromechanically actuated outrigger assembly, including a main body having a bearing point, an outrigger support to be connected to an outrigger boom, the support pivotally connected to the main body at the bearing point, an electrical actuator connected to the main body and having a movable piston, and a lever assembly operatively connecting the outrigger support to the piston to pivot the outrigger support about the bearing point when the piston moves, the lever assembly having a piston connection point offset vertically and laterally from the bearing point and being connected to the piston at the piston connection point.

In accordance with another feature of the invention, there is provided a support bearing connected to the main body and pivotally connecting the outrigger support tube to the main body at the bearing point.

In accordance with a further feature of the invention, the outrigger support is an outrigger support tube having an at least partly hollow portion adapted to receive the outrigger boom therein.

In accordance with an added feature of the invention, the electrical actuator has a piston control body and the piston is movably connected to the piston control body.

In accordance with an additional feature of the invention, the electrical actuator has a power supply assembly electrically connected to the piston control body and supplying at least one signal to the piston control body and the piston control body selectively moves the piston within a range defined by a fully retracted position and a fully extended position dependent upon a state of the signal.

In accordance with yet another feature of the invention, the main body is L-shaped with first and second ends, the piston control body is disposed at the first end, and the bearing is disposed at the second end.

In accordance with yet a further feature of the invention, the main body has a boat connection area.

In accordance with yet an added feature of the invention, the L-shape of main body defines an angle portion and a boat connection area is disposed at the angle portion.

In accordance with yet an additional feature of the invention, there is provided a boat connection assembly connected to the boat connection area for connecting the main body to a boat.

In accordance with again another feature of the invention, the boat connection assembly has a standoff plate, a standoff having first and second ends, the first end connected to the main body, the second end connected to the plate, a boat connector to be connected to the boat, and an insulating plate disposed between the boat connector and the standoff plate.

In accordance with again a further feature of the invention, the standoff plate, the insulating plate, and the boat connector are securely connected to one another.

In accordance with still a further feature of the invention, the boat connector is to be welded to the existing outrigger holder.

With the objects of the invention in view, there is also provided an electromechanically actuated outrigger assembly, including a main body having a bearing point, an outrigger support to be connected to an outrigger boom, a support bearing pivotally connecting the outrigger support to the main body at the bearing point, an electrical actuator connected to the main body, the electrical actuator having a piston control

body, a power supply assembly electrically connected to the piston control body and supplying at least one signal to the piston control body, a piston movably connected to the piston control body, the piston having a connection point, and the piston control body selectively moving the piston within a range defined by a fully retracted position and a fully extended position dependent upon a state of the signal, and a lever assembly operatively connecting the outrigger support to the connection point of the piston to pivot the outrigger support about the bearing point when the piston moves, the lever assembly having a piston connection point offset vertically and laterally from the bearing point and being connected to the piston at the piston connection point.

In accordance with again an added feature of the invention, the signal is a power signal having first and second polarities.

In accordance with again an additional feature of the invention, the first polarity of the power signal extends the piston and the second polarity of the power signal retracts the piston.

With the objects of the invention in view, there is also provided a powered outrigger kit for connecting an outrigger boom to an existing outrigger holder of a boat, including an

electromechanically actuated outrigger assembly having a main body having a bearing point, an outrigger support to be connected to the outrigger boom, a support bearing pivotally connecting the outrigger support to the main body at the bearing point, an electrical actuator connected to the main body and having a piston control body, a power supply assembly electrically connected to the piston control body and supplying at least one signal to the piston control body, a piston movably connected to the piston control body, the piston having a connection point, and the piston control body selectively moving the piston within a range defined by a fully retracted position and a fully extended position dependent upon a state of the signal, and a lever assembly operatively connecting the outrigger support to the connection point of the piston to pivot the outrigger support about the bearing point when the piston moves, the lever assembly having a piston connection point offset vertically and laterally from the bearing point and being connected to the piston at the piston connection point, and a boat connection assembly connected to the outrigger assembly and having a connector for connecting the outrigger assembly to the existing outrigger holder at the boat.

In accordance with still another feature of the invention, the connector of the boat connection assembly has a standoff plate, a standoff having first and second ends, the first end

connected to the main body, the second end connected to the plate, a boat connector to be connected to the existing outrigger holder, and an insulating plate disposed between the boat connector and the standoff plate for galvanically insulating the standoff plate from the boat connector.

With the objects of the invention in view, there is also provided a powered outrigger kit for connecting an outrigger boom to an existing outrigger holder of a boat, including an electromechanically actuated outrigger assembly having a main body having a bearing point, an outrigger support to be connected to an outrigger boom, the support pivotally connected to the main body at the bearing point, an electrical actuator connected to the main body and having a movable piston, and a lever assembly operatively connecting the outrigger support to the piston to pivot the outrigger support about the bearing point when the piston moves, the lever assembly having a piston connection point offset vertically and laterally from the bearing point and being connected to the piston at the piston connection point, and a boat connection assembly connected to the outrigger assembly and having a connector for connecting the outrigger assembly to the existing outrigger holder at the boat.

The automatic outrigger of the present invention can be used on fishing boats equipped with manual outrigger systems, most

commonly, the T-top supported type and permits remote control of vertical movements of outrigger booms (about bearing horizontal axis).

The outrigger system according to the invention only has two moving parts, making it simply to construct and very durable in a marine environment.

The outrigger system according to the invention eliminates the need for a captain to climb on gunwales to raise or lower outriggers on boats with T-tops. The system also provides complete control of outrigger movement from the captain's console. With the present invention, the outrigger booms can be raised and/or lowered at any boat speed. The system can be incorporated into existing boat outrigger holders simply.

The automatic outrigger of the present invention vests the user with full control of vertical outrigger movements without having to interrupt vessel control. With the present invention, it is safe to adjust outriggers while only one person is present on the vessel. Adjustments can be accomplished at any boat speed. The present invention entirely eliminates the need to physically access the remotely located outrigger boom. Rather, a conveniently located control switch is used to energize the electric automatic outrigger to effect outrigger boom movement.

The automatic outrigger of the present invention is easily converted to fit many common manual outrigger systems.

The automatic outrigger of the present invention is constructed of metallic tubing, employs an electric actuator, a series of levers, and a receiver into which the outrigger pole is to be placed. By energizing the electric actuator, the outrigger can be raised or lowered as desired.

Other features that are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in an electromechanically actuated outrigger, it is, nevertheless, not intended to be limited to the details shown because various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings.

Brief Description of the Drawings:

FIG. 1 is a diagrammatic, partially cross-sectional and partially perspective view of an outrigger system according to the invention in a lowered position;

FIG. 2 is a diagrammatic, partially cross-sectional and partially perspective view of the outrigger system of FIG. 1 in a raised position; and

FIG. 3 is a cross-sectional view of the outrigger system of FIG. 1 along section line 3-3.

Description of the Preferred Embodiments:

Referring now to the figures of the drawings in detail and first, particularly to FIGS. 1 and 2 thereof, there is shown an electromechanically actuated outrigger system 1 according to the invention.

The outrigger system 1 has an outrigger connection assembly 10, a base assembly 20, an electromechanical actuator assembly 30, and a boat connection assembly 40.

The outrigger connection assembly 10 includes a hollow, stainless steel, outrigger pole support tube 12 defining a tube interior. A sleeve 14 is inserted into the tube interior

and has an outer shape substantially corresponding to an inner shape of the tube interior. The sleeve 14 defines a sleeve interior having an inner shape corresponding to an outer shape of a standard outrigger pole. For example, the sleeve 14 accommodates pole diameters up to at least 3.8 cm (1 1/2").

To connect the outrigger boom 100 to the outrigger connection assembly 10, the sleeve 14 is placed around the proximal end of the outrigger boom 100 and the combined assembly 100, 14 is inserted into the tube 12. The outrigger boom 100 and sleeve 14 assembly are secured in the tube 12 by inserting a fastener 16 (preferably a bolt, nut, and washer assembly) through a retaining slot 18 in the tube 12 and, then, tightening the fastener 16 to clamp the assembly 100, 14 to the tube 12. Preferably, the sleeve 14 is made of Polyvinyl Chloride (PVC) to give the boom-tube connection a cushioned, but not loose, connection.

The base assembly 20, preferably, is of stainless steel and has a boom connection area 22, an actuator connection area 24, and a boat connection area 26. The outrigger connection assembly 10 is connected to the base assembly 20 at the boom connection area 22. Similarly, actuator assembly 30 is connected to the base assembly 20 at the actuator connection area 24, and the base assembly 20 is connected to a boat at the boat connection area 26.

The electromechanical actuator assembly 30 includes a power supply 32 (preferably, 12 volt DC), a controller 34, and an actuator 36 (preferably, an electro-mechanical ball drive linear actuator). In particular, the actuator 36 is a current protected, reversible, permanent magnet DC motor having a stroke of approximately 5.7 cm (2.25") for an eight (8) second period. The controller 34 can be a reversing switch assembly including a DPDT MOM-ON/OFF/MOM-ON sealed rocker switch mounted on a 7.6 cm x 5.1 cm (3" x 2") PVC plate pre-wired and ready for installation. The actuator 36 has an actuator piston 38 that extends and retracts based upon a signal produced by the controller 34.

Preferably, the boat connection assembly 40 has a shape that can be retrofitted to an existing outrigger holder already installed on the boat. Such outrigger holders have two basic components: a structure 110 fixedly attached to the boat (e.g., a portion of a T-top frame) and a vertically oriented outrigger holder 120, typically in the form of a hollow tube connected to the structure 110 in a freely rotating manner. The upper-most surface of the hollow holder 120 defines an orifice into which is placed a common outrigger assembly, for example, an outrigger produced by E-Tec Marine Products, Inc. Rotation of the holder 120, therefore, results in a

corresponding rotation of the system 1 and the outrigger boom 100.

According to the invention, a solid adaptor plate 56 is affixed (preferably, welded) to the support tube 120 of the existing boat outrigger. The plate 56 can be of any shape but square is preferred. Also, the plate 56 defines four fastening bores at each of the four corners for receiving a fastening structure therein. A washer 54 (which can be a PVC gasket) having four bores corresponding to the fastening bores of the plate 56 is placed above and on the aluminum plate 56.

There is a standoff 28 at the boat connection area 26 of the base assembly 20. This standoff 28 serves to fasten the base assembly 20 to the boat connection area 26. The standoff 28 ends with stainless steel plate 52. Preferably, the plate 52 is welded to the stainless steel standoff 28. Accordingly, the insulating washer 54 is disposed between the stainless steel base plate 52 and the aluminum adaptor plate 56 to prevent galvanic action between the dissimilar metals. The plate 52 also is square and has four holes corresponding to the holes in the plate 56 and the washer 54. Therefore, to fixedly attach the system 1 to the rotating holder 120, four non-illustrated fasteners (e.g., bolts) are inserted through the bores of the plates 52, 56 and washer 54 and are tightened to clamp the three plate structures 52, 54, 56 together.

Another possible embodiment for attaching the system 1 to a non-rotating aluminum holder 120 can provide a T-shaped aluminum part 56 -- the top of the T being a plate with four bores and the trunk of the T being a hollow cylinder that is inserted into the hollow of the holder 120 so that it is free to rotate therein. A similarly T-shaped washer part 54 can have a corresponding hollow trunk inserted into the hollow cylinder of part 56. The part 54 also has four bores corresponding to the bores of the part 56. A similarly T-shaped stainless steel connector part 52 can be fixedly connected to the standoff 28 with the trunk of the T being inserted into the hollow of the trunk of the washer part 54. The part 52 has four bores corresponding to the bores of the parts 54 and 56. Alternatively, the washer part 54 and the connector part 52 can merely be a plate without a trunk. Four fasteners (e.g., bolts) can be used to fixedly clamp the parts 52, 54, 56 to one another. In such a configuration, the system 1 and boom 100 are freely rotatable with respect to the fixed holder 120. Therefore, a separate latching/ratcheting device would be needed to prevent unwanted rotation of the system/boom assembly 1, 100.

The support tube 12 is operatively connected to the boom connection area 22, in particular, pivotally connected thereto. Various measures can be employed to make such a

connection.

For example, an end cap 21 can be T-shaped with a solid cylinder trunk having outer shape corresponding to the inner shape of an upper hollow of the boom connection area 22 and be liquid-tightly inserted therein. The end cap 21 can define a bore 23 having a shape that can accommodate a bearing post 25 therein such that the tube 12, fixedly connected to the bearing post 25, pivots with respect to the base assembly 20 from a horizontal position shown in FIG. 1 (or a degree below horizontal) to at least one raised position shown in FIG. 2.

Alternatively, the boom connection area 22 preferably forms a U-shape, which is illustrated diagrammatically in FIG. 3. In such an embodiment, the boom connection area 22 defines a bore 23 for receiving a bearing 25 therein. The tube 12 is formed with a corresponding bore 23 also for receiving the bearing 25 therein. First, the tube 12 is inserted into the U-shape of the boom connection area 22. Then, the bearing 25 is inserted through a first bore of the area 22, through the bore of the tube 12, and through the second opposite bore of the area 22. Then, the bearing 25 is fixedly connected (preferably, welded) to the boom connection area 22 so that the tube 12 can freely pivot about the axis of the bearing 25 through at least 45 degrees (compare FIGS. 1 and 2).

The support tube 12 can be pivoted on the bearing axis from an approximately horizontal position (in particular, approximately four degrees above the horizontal) through approximately 50 degrees above horizontal (in particular, to at least 47 degrees above horizontal).

The casing of the bearing 25 is securely welded to the base assembly 20 and support tube 12 and fitted with a length of ¾" self-lubricating acetal serving as bearing stock.

The actuator connection area 24 is hollow and is shaped to contain therein an electro-mechanical ball drive linear actuator 36 in a watertight manner to prevent entry of liquid into the interior of the base assembly 20 from the actuator connection area 24 side.

A lever assembly 60 operatively connects the piston 38 to the support tube 12. A lever arm 62 is connected to the outrigger support tube 12 at a bottom of the tube 12 (preferably, is welded to or is integral therewith). The lever arm 62 projects downwards away from the outer surface of the tube 12 at least past a first distance 61. The lever arm 62 also projects along the longitudinal axis of the tube 12 in a direction away from the outrigger boom 100 at least past a second distance 63. In a preferred configuration, the first distance 31 is between approximately 6 and 10 cm (in

particular 7.3 cm (2 7/8")) and the second distance 63 is between approximately 2 and 4 cm (in particular, 2.54 cm (1")). This ratio of distances produces a preferred rotation of approximately 47° at the fulcrum (bearing 25) with a horizontal displacement of the bore 64 position shown in FIG. 1 of between approximately 4 and 7 cm, in particular 5.7 cm (2 ¼")), to the right of FIG. 1 or as approximately shown in FIG. 2.

The lever arm 62 is connected operatively to the piston 38 such that the piston 38 can impart a force against the lever arm 62 in a direction approximately parallel to the longitudinal axis of the tube 12. The pivotal connection of the lever arm 62 to the piston 38 can be made by: (1) the lever arm 62 defining a bore 64 at a portion near the piston 38 and the piston 38 defining a corresponding bore coaxial with the bore 64 such that a separate pin can pass through both bores; (2) the piston 38 having a laterally extending rod with an outer shape corresponding to the shape of a bore 64 in the lever arm 62; or (3) the lever arm 62 having a laterally extending rod with an outer shape corresponding to the shape of a bore 64 at a distal end of the piston 38. Other similar connections are possible as well.

When the actuator is energized in an up position, the piston 38 extends from a position shown in FIG. 1 to a position shown

in FIG. 2, for example. The rotationally free connection between the piston 38 and the lever arm 62 allows the lever arm 62 to rotate with respect to the piston 38 as the piston 38 extends. The lever arm 62 and support tube 12 are constrained by the bearing to only rotate thereabout. Accordingly, as the piston 38 extends, the lever arm 62 and support tube 12 rotate about the bearing 25 to raise the distal end of the boom 100. The opposite occurs when the actuator is energized in a down position to lower the boom 100.

The pivoting connection between the piston 38 of the actuator 36 and the lever arm 62 converts linear motion of piston 38 into rotational motion controlling a horizontal angle of the outrigger support tube 12.